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# Typification of Names in Nine Species of *Arctotis* (Asteraceae, Arctotideae) from the Succulent Karoo, South Africa

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**ABSTRACT.** In preparation for the treatment of *Arctotis* L. (Asteraceae) in the upcoming *Conspectus of the Trans-Cape Succulent Karoo Flora of South Africa*, the typification of names and synonymy for nine *Arctotis* species that occur within the Succulent Karoo region, South Africa, are clarified. The author citation for *A. argentea* is corrected from Thunb. to *A. argentea* Aiton, and the lectotype is selected. In addition, lectotypes are designated for *A. auriculata* Jacq., *A. campanulata* DC., *A. campanulata* var. *puberula* DC., *A. canescens* DC., *A. cineraria* Jacq., *A. cuprea* Jacq., *A. denudata* Thunb., *A. diffusa* Thunb., *A. fastuosa* Jacq., *A. flaccida* Jacq., *A. flammea* Jacq., *A. glabrata* Jacq., *A. laevis* Thunb., *A. leucanthemoides* Jacq., *A. maximilianii* Schltr. ex Beauverd, *A. pusilla* DC., *A. revoluta* Jacq., *A. rosea* Jacq., *A. squarrosa* Jacq., *A. venidioides* DC., and *Venidium aureum* DC.

**Key words:** Arctotideae, Arctotidinae, *Arctotis*, Asteraceae, Compositae, South Africa.

*Arctotis* L. is the largest genus in the subtribe Arctotidinae, comprising approximately 60 to 70 species, and is widely distributed in southern Africa (Karis et al., 2009). The main center of taxonomic diversity of the genus is in the winter rainfall region of southern Africa. The taxonomy of *Arctotis* is especially chaotic. Some of the many taxonomic and nomenclatural problems have been resolved (McKenzie et al., 2006, 2008a, b; McKenzie & Barker, 2007), but many names are still in need of typification. In preparation for the treatment of *Arctotis* in the upcoming *Conspectus of the Trans-Cape Succulent Karoo Flora of South Africa* (Snijman, in prep.), we herein clarify the synonymy and typification of names for nine *Arctotis* species that occur within the geographic area of southern Africa defined by Jürgens (1991) as the Succulent Karoo region. This region approximately corresponds to the part of the winter rainfall region that experiences the greatest summer aridity.

## LECTOTYPIFICATION OF *ARCTOTIS ARGENTEA*

The name *Arctotis argentea* is usually attributed to Thunberg (1799). However, the name was validly

published by Aiton (1789), who recorded the introduction of the species to the Royal Botanic Gardens, Kew, by Francis Masson in 1774. Masson accompanied Thunberg on collecting expeditions into the interior of the Cape colony in 1773 and 1774 (Gunn & Codd, 1981). Although the descriptions for new names published by Aiton (1789) were prepared mainly by D. Solander and edited and amended by J. C. Dryander (Stafleu & Cowan, 1976), under Article 46.7 of the *International Code of Botanical Nomenclature* (ICBN; McNeill et al., 2006) the name *A. argentea* must be attributed to Aiton.

A sheet in the Herbarium of the Natural History Museum, London (BM), is annotated in pencil “*Arctotis argentea*, Thb.” and a label is attached bearing the inscription “Hort. Kew. 1777—Sem. E Cap. bon. Spei.” Thus the specimen was prepared from material cultivated at Kew, and because its preparation post-dates the recorded introduction of *A. argentea* to Kew in 1774 and precedes publication of the description in Aiton (1789), this sheet is suitable for designation as the lectotype for *A. argentea*. The specimen is consistent with the morphological descriptions of Aiton (1789) and Thunberg (1799).

***Arctotis argentea*** Aiton, Hort. Kew. 3: 273. 1789.

TYPE: [South Africa.] Cape of Good Hope: Hort. Kew. Sem. E Cap. bon. spei [Hortus Kewensis semen e Capite bonae spei], 1777, s. coll. (lectotype, designated here, BM).

## LECTOTYPIFICATION OF *ARCTOTIS AURICULATA*

*Arctotis auriculata* Jacq. is a robust, showy species from the Namaqualand region of northwestern South Africa. The species was described by Jacquin (1797). A single sheet (W 0006633) in the Naturhistorisches Museum Herbarium, Vienna (W), formerly in the Jacquin Herbarium, is annotated as *A. auriculata* and was designated the lectotype of this name on the sheet by Tycho Norlindh in 1980, but the typification was never published. The material agrees with the description and illustration in Jacquin (1797) and is herein formally designated the lectotype of *A. auriculata* Jacq.



The name *Arctotis flammea* Jacq., published by Jacquin (1809), is a synonym of *A. auriculata*. However, no original material formerly in the Jacquin Herbarium has been located. Therefore, the illustration of *A. flammea* in Jacquin (1809), which agrees with Jacquin's description in all important features, is designated the lectotype of *A. flammea*.

***Arctotis auriculata*** Jacq., Pl. Rar. Hort. Schoenbr. 2: 22, tab. 169. 1797. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis flammea* Jacq., Fragm. Bot. 41, tab. 47. 1809, syn. nov. TYPE: "*Arctotis flammea*" in Jacquin, Fragm. Bot., tab. 47. 1809 (lectotype, designated here, Jacquin, 1809: tab. 47).

#### LECTOTYPIFICATION OF *ARCTOTIS CAMPANULATA*

De Candolle (1838) described *Arctotis campanulata* DC., of which he distinguished two varieties (*A. campanulata*  $\alpha$  *subtomentosa* DC. and  $\beta$  *puberula* DC.). De Candolle did not list the corresponding autonym (*A. campanulata* var. *campanulata*). Under Article 26.2 of the ICBN (McNeill et al., 2006), since no type was indicated for *A. campanulata* DC., both varietal names were validly published. Under Article 26.3, the valid publication of the varietal names automatically established the autonym (*A. campanulata* var. *campanulata*). The species *A. campanulata* requires lectotypification from among the specimens cited for each variety, which are therefore syntypes of *A. campanulata*.

De Candolle (1838: 485) stated that for both varieties he examined material collected by Drège in "Klein Namaqualand." In G-DC, two plants from the gathering Drège 6162 are mounted on a sheet labeled "*Arctotis campanulata*  $\alpha$  *subtomentosa*," and on a separate sheet a single plant of the gathering Drège 2749 is labeled "*Arctotis campanulata*  $\beta$  *puberula*." Duplicate sheets of Drège 2749 and 6162 are lodged in the Herbarium of the Muséum national d'Histoire naturelle, Paris (P). Additional material annotated as each variety, collected by Drège but lacking collector's numbers, are lodged in the Herbarium in G, Kew Herbarium (K), Missouri Botanical Garden Herbarium (MO), and the National Herbarium, Pretoria (PRE).

De Candolle (1838) distinguished the two varieties based on leaf pubescence and leaf lobe apex shape. Although *Arctotis campanulata* has been recognized in most subsequent treatments, its morphological characterization and discrimination from *A. acaulis* are problematic, and in herbaria the name has been applied to specimens belonging to several species. *Arctotis acaulis* is a very polymorphic species, varying

particularly in leaf shape and dissection, and leaf and involucre bract pubescence. An investigation of the entire *A. acaulis* species complex is in progress. Pending the outcome of this investigation, the taxonomic recognition of *A. campanulata* is retained.

The duplicate of Drège 2749 in G-DC is herein designated the lectotype for *Arctotis campanulata* var. *puberula*. In morphology *A. campanulata* var. *puberula* is dubiously distinct from *A. acaulis* L. and might ultimately be placed in synonymy of that name, whereas *A. campanulata* var. *subtomentosa* is more disparate in morphology and appears to be specifically distinct from *A. acaulis*. Therefore, with nomenclatural stability in mind, the sheet Drège 6162 in G-DC is selected as the lectotype of *A. campanulata* DC.

On isotype sheets in P, the provenance of Drège 2749 is stated to be Mierenkasteel, the farm now known as Meerhofkasteel located southwest of Bitterfontein, Western Cape (Gunn & Codd, 1981), and the origin of Drège 6162 is specified as Haazenkraalsrivier. The collector's numbers 2749 and 6162 were not specified by Drège (1843), but he recorded collecting *A. campanulata* from "Haazenkraalsrivier, am Fluss und auf der Höhe daselbst," 600–760 m, "zwischen Uitkomst und Geelbekskraal," 600–900 m, and "bei Mierenkasteel, karrooartige Höhe," 300–600 m (Drège, 1843: 94, 96).

***Arctotis campanulata*** DC., Prodr. 6: 485. 1838. *Arctotis campanulata* var. *subtomentosa* DC., Prodr. 6: 485. 1838, syn. nov. TYPE: South Africa. Northern Cape: Haazenkraalsrivier, 450–600 m, 24 Aug. 1830, J. F. Drège 6162 (lectotype, designated here, G-DC; isotypes, P).

***Arctotis campanulata*** var. ***puberula*** DC., Prodr. 6: 485. 1838. TYPE: South Africa. Western Cape: "bei Mierenkasteel," 300–600 m, 6 Aug. 1830, J. F. Drège 2749 (lectotype, designated here, G-DC; isotypes, P).

#### LECTOTYPIFICATION OF *ARCTOTIS CANESCENS* AND *A. DIFFUSA*

De Candolle (1838) described *Arctotis canescens* DC. from two gatherings by Drège: Drège 671 from the Kamdeboberg and Drège 6161 from the Khamiesberg. The gatherings are of two distinct *Arctotis* species. The Drège 671 gathering was of the species previously named by Thunberg (1799) as *A. diffusa* Thunb. The Drège 6161 specimen is of a species not formally linked to a name previously.

*Arctotis canescens* and *A. diffusa* are readily distinguishable based on morphology and ecology (R. J. McKenzie, unpublished). A sheet in the Thunberg Herbarium (UPS-THUNB 20766), annotat-



ed "*Arctotis diffusa*" and consistent with Thunberg's (1799) description, is designated herein as the lectotype of *A. diffusa*. Designation of *Drège 671* as the lectotype of *A. canescens* would result in the placement of the name as a synonym of *A. diffusa* and require publication of a new name for the species represented by *Drège 6161*. Therefore, *Drège 6161* is herein designated as the lectotype of *A. canescens*.

***Arctotis canescens*** DC., *Prod.* 6: 485. 1838. TYPE: South Africa. Northern Cape: Kamiesberg, Roo-deberg, Gydokap, s.d., *J. F. Drège 6161* (lectotype, designated here, G-DC).

***Arctotis diffusa*** Thunb., *Arctotis*: 9. 1799. TYPE: South Africa. "Promontorio bonae spei Africes," s.d., *C. P. Thunberg s.n.* (lectotype, designated here, UPS-THUNB).

#### LECTOTYPIFICATION AND SYNONYMY OF *ARCTOTIS FASTUOSA*

*Arctotis fastuosa* Jacq. is one of the major components of the famous spring-flowering annual Namaqualand daisies. The species was described by Jacquin (1797) from material cultivated in the gardens of the Schönbrunn Palace in Vienna. The original provenance of the plants was stated as "ex Promontorium bonae spei." One sheet formerly in the Jacquin Herbarium annotated as *A. fastuosa* is lodged at W and can be considered as the lectotype. The species varies greatly in size and leaf morphology and pubescence, but possesses distinctive achenes (see McKenzie et al., 2005). In the present study, four additional names were confirmed to be based on specimens of *A. fastuosa*, namely *A. maximilianii* Schltr. ex Beauverd, *A. mirabilis* Dümmer, *Venidium aureum* DC., and *V. wyleyi* Harv. Hoffmann (1910: 313) listed the names "*A. Wybi* (Harv.) O. Hoffm.—*Venidium Wybi* Harv., l.c., p. 463," which was clearly intended to be *V. wyleyi* of Harvey (1865) and Hoffmann's new combination *A. wyleyi*; this can be treated as a typographic error requiring correction rather than Hoffmann (1910) publishing a new name.

***Arctotis fastuosa*** Jacq., *Pl. Rar. Hort. Schoenbr.* 2: 20, tab. 166. 1797. *Venidium fastuosum* (Jacq.) Stapf, *Bot. Mag.* 152: tab. 9127. 1928. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Venidium aureum* DC., *Prodr.* 6: 494. 1838. *Arctotis aurea* (DC.) Beauverd, *Bull. Soc. Bot. Genève, Sér. 2*, 7: 44. 1915, non *Arctotis aurea* Burm. f., 1768, nom. illeg. TYPE: South Africa. Northern Cape: "zwischen Zwartdoornrivier und Groenrivier," 12 Aug. 1830, *J. F. Drège 2739* (lectotype, designated here, G-DC; isotypes, P).

*Venidium wyleyi* Harv. in Harv. & Sond., *Fl. Cap.* 3: 463. 1865. *Arctotis wyleyi* (Harv.) O. Hoffm., *Ann. Nat. Hofmus. Wien* 24: 313. 1910, as "*wybi*." TYPE: South Africa. Namaqualand, s.d., *A. Wyley s.n.* (holotype, TCD).

*Arctotis mirabilis* Dümmer, *J. Roy. Hort. Soc.* 40: 81. 1914. TYPE: South Africa. Little Namaqualand: Klipfontein, May 1902, *E. Foxwell s.n.* (holotype, K).

*Arctotis maximilianii* Schltr. ex Beauverd, *Bull. Soc. Bot. Genève, Sér. 2*, 7: 49. 1915. TYPE: South Africa. Namaqualand: Zabies, 12 July 1897, *M. Schlechter s.n.* (lectotype, designated here, K; isotypes, BR, HBG, P).

#### LECTOTYPIFICATION AND SYNONYMY OF *ARCTOTIS FLACCIDA*

*Arctotis flaccida* Jacq. and *A. leucanthemoides* Jacq. were described by Jacquin (1797) from plants with an annual life history cultivated in the gardens of the Schönbrunn Palace in Vienna. The original provenance of the plants was stated to be "ex Promontorium bonae spei" (Jacquin, 1797: 19). Two sheets formerly in the Jacquin Herbarium annotated as *A. flaccida* and *A. leucanthemoides*, respectively, are lodged in W and can be considered as the respective lectotypes. Close examination of the specimens, focusing on the leaf morphology and arrangement, particularly that of the upper leaves, and immature achene and pappus morphology proved that the two names apply to the same species. The name *A. flaccida* is an appropriate allusion to the thin, precociously wilting nature of the leaves of this species and, consequently, this name is here selected as the valid name for the species.

De Candolle (1838) described two species, *Arctotis pusilla* DC. and *A. venidioides* DC., based on two separate Drège gatherings from the Olifantrivier area in the Western Cape. Previous authors have shown uncertainty in applying the two names but, based on the above-mentioned morphological features and the specimens' provenances, the names clearly apply to the same species as the names *A. flaccida* and *A. leucanthemoides*. The name *A. pusilla* was applied to a young plant that had a shortly caulescent habit and predominantly rosulate leaves. In contrast, the names *A. flaccida*, *A. leucanthemoides*, and *A. venidioides* were based on older plants in which lateral flowering stems with elongated internodes had developed.

A further name, *Arctotis gowerae* E. Phillips, which was based on plants grown from seeds collected in the Vanrhynsdorp district (Phillips, 1927), also applies to the same taxon and is herein placed in synonymy of *A. flaccida*. *Arctotis gowerae* has previously been considered to be a synonym of *A. fastuosa*, but differs from that species in leaf morphology and arrangement and the presence of a pappus of rudimentary scales. The holotype of *A. gowerae* is a single flowering lateral branch; the robust size reflects its horticultural origin.

Beyers (2000) placed *Arctotis semipapposa* (DC.) Beauverd as a synonym of *A. flaccida* without



comment, but such a treatment is erroneous (McKenzie et al., 2008b).

***Arctotis flaccida*** Jacq., Pl. Rar. Hort. Schoenbr. 2: 19, tab. 163. 1797. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis leucanthemoides* Jacq., Pl. Rar. Hort. Schoenbr. 2: 19, tab. 164. 1797, syn. nov. *Ursinia leucanthemoides* (Jacq.) Poir., Encycl. 8: 258. 1808, as "*leucanthemifolia*." *Lycotis leucanthemoides* (Jacq.) Hoffmanns., Verz. Pfl.-Nachtr. 2: 99. 1826. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis pusilla* DC., Prodr. 6: 489. 1838, syn. nov. TYPE: South Africa. Western Cape: "bei Olifantrivier, auf karrooartigen Höhen," under 1000 ft., s.d., *J. F. Drège* 2740 (lectotype, designated here, G-DC).

*Arctotis venidioides* DC., Prodr. 6: 489. 1838, syn. nov. TYPE: South Africa. Western Cape: "Olifantrivier, Ebenezer, auf steinigen, trocknen (karrooartigen) Hügeln," under 500 ft., s.d., *J. F. Drège* 6164 (lectotype, designated here, G-DC; isotypes, P).

*Arctotis gowerae* E. Phillips, Fl. Pl. South Africa 7: tab. 241. 1927, syn. nov. TYPE: South Africa. Western Cape: "Vanrhynsdorp dist., grown at the Division of Botany from seeds supplied by Mrs E. Rood," June 1924, *E. Phillips* 6036 (holotype, PRE).

#### LECTOTYPIFICATION AND SYNONYMY OF *ARCTOTIS REVOLUTA*

The species generally known as *Arctotis revoluta* Jacq. is a widespread element of the *A. aspera* L. species complex and is distributed in Namaqualand and the Western Cape. The complex is morphologically diverse and taxonomically difficult, with a number of the forms receiving names at the species and variety levels. Resolution of taxa within the complex is one focus of an ongoing investigation. In the interim, forms with often secondarily pinnatisect leaves with narrow pinnae and revolute margins, and a distinctly shrubby, erect habit, are treated as a distinct species, *A. revoluta*, and names placed in its synonymy are herein typified. The leaf pubescence is extremely variable, but always includes a dense covering of short glandular trichomes, and may also bear moderately dense gray woolly tomentum and/or scabrid multiseptate trichomes. It must be noted that the name *A. aspera* var. *undulata* P. J. Bergius and the combination *A. undulata* (P. J. Bergius) Gaertn. may apply to this taxon and, if correct, would have nomenclatural priority over the name *A. revoluta*.

Four names published by Jacquin (1797, 1798), namely *Arctotis cineraria* Jacq., *A. cuprea* Jacq., *A. glabrata* Jacq., and *A. squarrosa* Jacq., are here treated as conspecific and synonyms of *A. revoluta*. Specimens labeled as *A. cuprea*, *A. glabrata*, and *A. squarrosa*, formerly in the Jacquin Herbarium and

prepared from material cultivated in the gardens of the Schönbrunn Palace, are lodged in W and thus can be considered as the respective lectotypes. The sheet in W (W 0006631), annotated as *A. cuprea* Jacq., was designated the lectotype of *A. cuprea* by Tycho Norlindh in 1980, but the typification was never published. No such specimen labeled as *A. cineraria* is extant in W. However, a specimen collected by J. Banks from "Capite bonae spei," formerly in the Jacquin Herbarium and annotated "*Arctotis (aspera) cineraria* Jacquin," is lodged in W. Jacquin (1797) gave no indication of seeing a gathering by Banks in the protologue of *A. cineraria*, so it cannot be assumed that the specimen formed part of the original material. In the absence of an extant specimen prepared from material cultivated in the Schönbrunn garden, the illustration of *A. cineraria* accompanying the protologue in Jacquin (1797) is herein designated the lectotype for *A. cineraria*.

***Arctotis revoluta*** Jacq., Pl. Rar. Hort. Schoenbr. 2: 24, tab. 173. 1797. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis cineraria* Jacq., Pl. Rar. Hort. Schoenbr. 2: 24, tab. 174. 1797, syn. nov. TYPE: "*Arctotis cineraria*" in Jacquin, Pl. Rar. Hort. Schoenbr. 2: tab. 174. 1797 (lectotype, designated here, Jacquin, 1797: tab. 174).

*Arctotis glabrata* Jacq., Pl. Rar. Hort. Schoenbr. 2: 25, tab. 175. 1797, syn. nov. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis cuprea* Jacq., Pl. Rar. Hort. Schoenbr. 2: 25, tab. 176. 1797, syn. nov. *Arctotis aspera* var. *cuprea* (Jacq.) DC., Prodr. 6: 488. 1838. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis squarrosa* Jacq., Pl. Rar. Hort. Schoenbr. 2: 25, tab. 177. 1797, syn. nov. TYPE: [South Africa.] Hort. Schönbr. [Hortus Schoenbrunnensis], s.d., s. coll. (lectotype, designated here, W).

*Arctotis laevis* Thunb., Arctotis: 10. 1799, syn. nov. TYPE: [South Africa.] "Ex Promontorio bonae spei," s.d., *C. P. Thunberg* s.n. (lectotype, designated here, UPS-THUNB).

*Arctotis denudata* Thunb., Arctotis: 14. 1799, syn. nov. TYPE: [South Africa.] "Ex Promontorio bonae spei," s.d., *C. P. Thunberg* s.n. (lectotype, designated here, UPS-THUNB).

*Arctotis crispata* Hutch., A Botanist in Southern Africa: 158. 1946, adnot., syn. nov. TYPE: South Africa. Northern Cape: Kamieskroon, 14 Oct. 1928, *J. Hutchinson* 845 (holotype, K; isotypes, BOL, PRE).

#### LECTOTYPIFICATION OF *ARCTOTIS ROSEA*

*Arctotis rosea* Jacq. is a poorly known species described by Jacquin (1797) from a plant "ex Promontorio bonae spei" cultivated in the gardens of the Schönbrunn Palace, Vienna. The species is